Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz	)	GN Docket No. 18-122

COMMENTS OF NOKIA

Nokia submits these Comments in response to the Public Notice issued by the Office of Engineering and Technology, International, and Wireless Telecommunications Bureaus seeking comment for a report on the feasibility of allowing commercial wireless services, licensed or unlicensed, to use or share use of the frequencies between 3.7-4.2 GHz. These Comments are submitted consistent with earlier submissions by Nokia, which we incorporate by reference. Specifically, we incorporate by reference submissions of Nokia submitted in GN Docket No. 17-183, including the Nokia 17-183 Comments,[1] the Nokia 17-183 Reply Comments[2] and the Nokia January 2018 Ex Parte.[3]

Below, we address the three questions raised in the Public Notice and include specific references to Nokia submissions that address the issues in greater detail.

[1] Comments of Nokia, GN Docket No. 17-183 (filed Oct. 2, 2017) ("Nokia 17-183 Comments").

[2] Reply Comments of Nokia, GN Docket No. 17-183 (filed Nov.15, 2017) ("Nokia 17-183 Reply").

[3] Letter from Jeffrey Marks, Nokia, to Marlene Dortch, Federal Communications Commission, GN Docket No. 17-183 (filed Jan. 22, 2018) ("Nokia January 2018 Ex Parte").

1. How should the Commission assess the operations and possible impacts of sharing on Federal and non-Federal users already operating in this band?

As the Public Notice recognizes, there is no Federal allocation in the band, so it appears that the relevant assessment is with respect to sharing with non-Federal users.[4] Nokia therefore focuses its response on coexistence with such non-Federal users.

The key to assessing the impact of sharing on current users in the band is to understand the full extent of, and technical characteristics of, those current uses. The vast majority of current users operate in the Fixed Satellite Service (FSS). Unfortunately, at this time, there is a lack of correct, public data to conduct an accurate assessment. Nokia urges that the Commission require current earth station licensees to improve the accuracy of the Commission's database, and that the assessment quantify only the impact on registered earth stations.

The Nokia 17-183 Comments demonstrate that use of the 3.7-4.2 GHz band has been in steady decline for years, and that the Commission's database is replete with errors. As our earlier filings demonstrate, approximately 30 percent of facilities in the database do not appear to actually exist.[5] As such, it appears that the Commission's database overstates the current use of the band. The Nokia 17-183 Comments also describe another issue with accurately assessing existing services: the Commission's rules are conducive to over-representing how intensively any given earth station is using the band.[6] Specifically, pursuant to the current practice of "full-band, full-arc" coordination, FSS licensees are given the right to reserve a full 500 MHz of spectrum even if the licensee needs only a small fraction of that amount. With respect to "full arc," the FSS operators often claim communications with all

[4] To the extent there are any Federal users in the band, Nokia understands they would be commercial customers of non-Federal licensees and would need to be considered in an equitable way, just as non-Federal users would be considered.

[5] Nokia 17-183 Comments at 6-8.

[6] *Id.* 8-9.

points in the geostationary arc, even though many dishes stay pointed at the same satellite for years. Many dishes are even bolted in place and cannot be easily repointed.

Nokia also suggests that the Commission collect full information on receiver characteristics, and that use of receiver characteristics be part of the analysis. As we noted in the Nokia 17-183 Comments, earth station operators typically claim to require tight interference protections such as -129 dBm/MHz recently adopted in Part 96 rules. These criteria were self-derived by the FSS industry at the ITU decades ago, with little or no consideration of other services, and modern spectrum use and management. We further note that many FSS sites are surrounded by foliage and other obstacles providing additional protection from terrestrial interference. Such attenuation should be considered when determining the potential interference into FSS earth stations from terrestrial systems.

2. How might sharing be accomplished, with licensed and/or unlicensed operations, without causing harmful interference to Federal and non-Federal users already operating in this band, and in which parts of the band would such sharing be feasible?

The Nokia 17-183 Comments and January 2018 Ex Parte provide an initial technical analysis of potential sharing in the 3.7 GHz band.[7] Nokia's preliminary study shows that the required exclusion zones around Fixed Earth Stations (FESs) could be a limiting factor for 5G deployments when the 5G and FSS systems are deployed co-channel, especially in dense urban ones where FESs are present.

Since co-channel operation of 5G and FESs in close proximity could be problematic, we studied the case where the two systems are not using the same spectrum blocks. Under our assumptions and deployment scenarios, a guard band of 15 MHz between FSS and 5G

[7] Comments of Nokia at 10-13; January 18 Ex Parte, Attachment at 1-21.

appears sufficient to protect the FES receivers. If real-world parameters of the FESs are known, the study could be repeated to determine a more accurate guard band requirement.

Nokia urges the Commission to clear the band of satellite FESs to allow 5G systems to thrive in the band. In the past Nokia requested that the Commission ensure the decreasing use of 3.7-4.2 GHz band by FSS, by placing moratoria on new earth stations and on earth station renewals. Indeed, since Nokia made that request, the Commission acted to institute a freeze on applications for new or modified FSS earth stations in the 3.7-4.2 GHz band, to get a better sense of existing services.[8] Alternative transmission platforms like fiber could also be encouraged. The Commission could also consider additional sharing tools, such as database-enabled sharing as a transitional step to FSS exiting the band or repacking.

3. What other considerations should the Commission take into account in preparing the 3.7-4.2 GHz Report?

Nokia has consistently advocated that the 3.7-4.2 GHz band should be the centerpiece band for U.S. terrestrial 5G. Nokia's 17-183 Comments set forth multiple reasons why the combination of propagation characteristics, allowing reuse of existing infrastructure, and potential bandwidth make the band particularly promising.[9] In those Comments, Nokia also demonstrate the global ecosystem that is building around the 3 GHz range for 5G.[10] Beyond that, we stress the criticality of the U.S. keeping pace with the 5G deployment efforts in other countries, in particular China, South Korea, and Japan, where allocation of this range is occurring *this year.* Indeed, the governments in each of these countries have prioritized

[8] Public Notice, Temporary Freeze on Applications for New or Modified Fixed Satellite Service Earth Stations and Fixed Microwave Stations in the 3.7-4.2 GHz Band, 90-Day Window to File Applications for Earth Stations Currently Operating In 3.7-4.2 GHz Band Freeze and Filing Window in Furtherance of the Commission's Pending Inquiry in GN Docket Nos. 17-183, 18-122, GN Docket Nos. 17-183, 18-122, DA 18-398 (rel. Apr. 19, 2018).

[9] Nokia 17-183 Comments at 3-6.

[10] *Id.*

providing 100 MHz (or more) of spectrum *per operator* in this mid-band spectrum range to deploy robust 5G. Nokia urges that the Commission consider the implications of this race to 5G and the potential for the U.S. to fall behind. For each of these reasons, the highest and best use of the 3.7-4.2 GHz range is terrestrial 5G, not FSS uses which are in decline and have alternative paths to serve the existing user base.

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Nokia appreciates the opportunity to share its views in response to the Public Notice. We ask that the Commission consider each of the factors discussed above, and in the Nokia pleadings incorporated by reference, in assessing the opportunities to introduce terrestrial 5G services into the 3.7-4.2 GHz band.

Respectfully submitted,

Nokia

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May 31, 2018